Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

ORIGINAL

In the Matter of	)	
	)	
Amendment of Section 90.20(e)(6) of the	)	RM-_____
Commission's Rules Regarding	)	
Stolen Vehicle Recovery Systems	)	

PETITION FOR RULEMAKING

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LoJack Corporation ("LoJack"), by its attorneys and pursuant to Section 1.401 of the Commission's rules, hereby requests that the Commission initiate a rulemaking to amend 47 C.F.R. § 90.20(e)(6) ("Section 90.20(e)(6)"), which governs Stolen Vehicle Recovery System ("SVRS") operations on 173.075 MHz.[1]

I. INTRODUCTION AND SUMMARY

LoJack seeks to broaden the scope of Section 90.20(e)(6) to permit the use of 173.075 MHz for public safety/security purposes in addition to stolen vehicle recovery. LoJack also seeks associated changes to the technical requirements for 173.075 MHz.

A convergence of factors presents a unique opportunity to improve the use of 173.075 MHz. As a result of proposed SVRS requirements for operating on narrowband channels, LoJack will be required to embark on a complete redesign of the hardware and software components of its system. This redesign will enable LoJack to take advantage of technological advances that followed the adoption of Section 90.20(e)(6). It also will enable LoJack to add

[1] LoJack also seeks conforming changes to US Footnote 312 of the Table of Frequency Allocations, which is set forth in Section 2.106 of the rules.

system capabilities that are responsive to the growing needs of law enforcement authorities and consumers for radio-based public safety/security services.

To enable LoJack to meet these requirements and to compensate for system degradation that is expected to result from the move to narrowband operations, LoJack requests the following changes to the technical requirements set forth in Section 90.20(e)(6):

1. increase maximum base station ERP from 300 watts to 500 watts and "VLU" transmitter output power from 2.5 watts to 5 watts to compensate for the reduced range of narrowband channels;

2. permit use of digitally modulated emissions, in addition to the F1D and F2D modulation schemes already specified in the rules;

3. eliminate limitations on duty cycles to enable parallel wideband and narrowband operations and the provision of additional public safety and security services;

4. license mobile transceivers by rule, to permit nationwide activation by mobile telephony transmissions; and

5. eliminate the requirement for Channel 7 interference studies, which are no longer necessary.

The rule changes LoJack is requesting will serve the public interest. The changes will further the Commission's policies favoring spectrum flexibility; improve stolen vehicle recovery; aid public safety agencies in carrying out their responsibilities; expand the range of radio-based public safety/security services that are available to consumers; and enhance spectrum efficiency. Accordingly, the Commission should initiate a rulemaking to modify Section 90.20(e)(6) in the manner requested herein.

II. BACKGROUND

Section 90.20(e)(6) of the Commission's rules authorizes SVRS operations on 173.075 MHz on a shared basis with federal government users.[2] The LoJack SVRS, operated in conjunction with state and local police departments, is the most extensive radio-based stolen vehicle recovery system in the world. Since 1989, when the Commission authorized LoJack to operate on a regular basis, LoJack has deployed its system nationally in twenty-two states and the District of Columbia, an area that accounts for approximately 2/3 of the vehicle sales and vehicle thefts in the United States. The requested rules changes will facilitate expansion of the system into the remaining states. LoJack has licensed its technology in 25 countries, including Mexico, Argentina, Brazil, Colombia, Venezuela, Ecuador, the United Kingdom, South Africa, Spain, France, Germany, Poland, and Russia.[3]

The LoJack system is comprised of three types of equipment: Vehicle Location Units ("VLUs") located in motor vehicles; Vehicle Tracking Units ("VTUs") located in police vehicles[4]; and base stations licensed to law enforcement agencies in twenty-two states. LoJack also employs a considerable amount of software to run the system. In the United States LoJack, VLUs are currently installed in more than 3 million vehicles and can be tracked by 11,000 VTUs; law enforcement agencies operate 125 base stations with more of each being added each year. Additionally, LoJack offers an "early response" system, which is monitored by base station receivers. The LoJack system currently operates on a 20 kHz wide channel, using F1D and F2D emissions.

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[2] 47 C.F.R. § 90.20(e)(6).
[3] The SVRS in North and South America operate on 173.075 MHz using 20 kHz, "wideband" channels.
[4] Formerly called Police Tracking Computer ("PTC").

Presently, LoJack's stolen vehicle recovery network operates as follows. VLUs are hidden in vehicles and remain dormant until activated by the police. When a vehicle owner submits a stolen vehicle report to the police, the information is entered into a central law enforcement computer linked to the LoJack SVRS. This computer system, in turn, causes the "Sector Activation System," a network of radio base stations licensed to the police, to periodically transmit a uniquely coded "activation" message that instructs the VLU to begin transmitting a brief periodic "tracking" message. The "tracking message" contains a unique reply code, which is received by the VTUs installed in law enforcement vehicles. Police identify the vehicle make, model and registration from the reply code, and then track and recover the stolen vehicle. The base stations transmit the activation messages until the vehicle is recovered or, in areas that have been upgraded to incorporate the "early response" feature, until the base stations receive an acknowledgment from the VTU.

With LoJack's optional early warning system, if the vehicle is moved without the owner's key fob being present, LoJack notifies the owner who, if the vehicle has been stolen, notifies police. The system's base stations then are activated in the same manner as when a vehicle owner reports directly that his or her vehicle has been stolen.

To date in the United States, LoJack's system has assisted in the recovery of more than 100,000 vehicles, with an estimated total value of over $1,000,000,000. On many occasions when police recover a LoJack-equipped vehicle, they also recover other stolen vehicles and vehicle parts that are present. The police have found the SVRS technology to be useful in solving other criminal activity, such as the production of illegal drugs, and have achieved a recovery rate of LoJack equipped vehicles of more than ninety percent.

III. PROPOSED RULE CHANGES

The Commission recently issued a Notice of Proposed Rulemaking ("NPRM") proposing to change the use of the SVRS frequency from wideband to narrowband operations.[5] LoJack did not object to this rule change, but did file comments addressing the effects of the rule change on its SVRS. As discussed in detail in LoJack's comments on the NPRM, because of the change to narrowband operations LoJack will have to expend significant resources to redesign its U.S. system.[6] Most significantly, LoJack will need to redesign and redeploy its entire RF infrastructure and supporting software. As part of this process, LoJack technicians and field engineers will have to travel throughout the country to install equipment that will upgrade over 11,000 VTUs, 125 base stations and 125 uplink receivers.

Following this extensive redesign and redeployment effort, which LoJack estimates will take four years to complete, there still will be over 3 million wideband VLUs in consumer vehicles that LoJack will need to continue servicing for an additional 10 years. In order to allow law enforcement to activate and track these wideband units after the narrowband system has been activated, LoJack will be forced to operate parallel systems during this ten-year transition period. Although technically and economically burdensome, the redesign of its network gives LoJack an opportunity to update its technology. As a result, LoJack will be able to provide public safety entities and the public with additional public safety services while making more efficient use of the frequency.

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[5] *In the Matter of Amendment to Parts 2 and 90 of the Commission's Rules to Provide for Narrowband Private Land Mobile Radio Channels in the 150.05-150.8 MHz, 162-174 MHz, and 406.1-420 MHz Bands that are Allocated for Federal Government Use*, Notice of Proposed Rulemaking, 19 FCC Rcd 12690 (2004).

[6] LoJack Comments at 7, *In the Matter of Amendment to Parts 2 and 90 of the Commission's Rules to Provide for Narrowband Private Land Mobile Radio Channels in the 150.05-150.8 MHz, 162-174 MHz, and 406.1-420 MHz Bands that are Allocated for Federal Government Use*, Notice of Proposed Rulemaking, ET Docket No. 04-243 (filed Sept. 2, 2004).

Additionally, as part of its system redesign, LoJack plans to incorporate GPS and cellular technology into its VLUs. Section 90.20(e)(6) is technologically neutral, so LoJack will not require a rule change to use this technology. The use of GPS and cellular technologies, however, will work in tandem with other system changes that will be made possible by LoJack's requested rule changes, thereby enabling LoJack to reduce transmissions on its higher-powered base stations and to provide enhanced, more efficient services to public safety entities and therefore to the public.

For example, licensing VLUs by rule will facilitate LoJack's use of cellular technology to expand to nationwide coverage. This will make it possible for law enforcement authorities to activate, track, and deactivate stolen vehicles in states in which there is no police licensee. It also will make it possible, in states in which there is a police licensee and a stolen vehicle is equipped with cellular technology, to activate the vehicle's VLU without having to transmit on the system's base stations.

LoJack also intends to place GPS receivers in the VLUs, which will provide law enforcement authorities with more precise vehicle location information. Having more accurate location information will reduce the number of base stations that must be activated to track a stolen vehicle. Having an approximate location prior to initiation of tracking will enable the police to track stolen vehicles with less resources and to locate stolen vehicles in a shorter amount of time. Faster recovery, in turn, should result in greatly reduced damage to stolen vehicles.

A. Expansion of Services

LoJack seeks a rule change permitting 173.075 MHz to be used to provide law enforcement and other public safety entities with additional services related to public safety, health and welfare, and national security. Activation and tracking would only be by emergency response services (police, fire, ambulance, etc.), and would not include concierge, convenience, or fleet management services.

Some possible law enforcement applications include: (1) tracking stolen articles such as cargo containers, Automated Teller Machines, hazardous materials and nuclear waste; (2) addressing user emergencies by providing automatic collision notification, medical emergency or vehicle fire notification, and carjacking alerts; (3) tracking missing or wanted persons; (4) locating people at risk such as Alzheimer's patients, autistic children, sex offenders, parolees, and individuals under house arrest, if established boundaries are violated; and (5) location on demand services authorized by public safety agencies.[7] Whatever the particular service, the activation of the tracking units always will remain under the control of law enforcement and other public safety entities.

B. Necessary Technological Modifications

LoJack seeks several changes to Section 90.20(e)(6) to compensate for the technical problems associated with its forthcoming move to narrowband operations and to update the rule

[7] The National Crime Information Center uses the terms stolen article, missing person, and wanted person to describe law enforcement data processing practices. An automated SVRS system controlled by law enforcement could be extended into these categories.

to reflect current technology. The move to narrowband operations will reduce the range of LoJack's transmissions and LoJack seeks to ensure that law enforcement licensees maintain their present coverage and are not required to deploy new facilities simply to maintain the *status quo*. In addition, LoJack requires some rule modifications to deploy a state-of-the-art system and provide additional services. For these and the foregoing reasons, LoJack requests the following technical rule changes to Section 90.20(e)(6).

i. Increased Power Levels

LoJack seeks to increase the frequency's allotted power levels from 300W ERP to 500W ERP for base station transmissions and from 2.5 W to 5W output power for VLU transmissions. As LoJack noted in its comments to the narrowband NPRM, reducing the bandwidth of the SVRS frequency will reduce the range of both the SVRS base stations and the vehicle tracking units. Narrowband operations also will reduce LoJack's coverage for VLU transmissions. As well, the additional services LoJack seeks to provide will require reliable communications to ensure that public safety agencies receive messages sent from the VLUs, and receive them quickly. Higher VLU power also will enable law enforcement authorities to operate fewer receivers, thereby freeing up resources for other public safety purposes.

ii. Digital Emissions

LoJack seeks to eliminate the limitations on allowed emissions, thereby enabling it to use either analog or digital emissions as needed to take advantage of technological developments that have occurred since its system was conceived. LoJack currently operates on an analog scheme using F1D and F2D emissions, and needs the additional flexibility and efficiencies that digital

technology can afford. Moreover, use of digital emissions could allow LoJack to compensate for the reduced data transmission capacity it will encounter when it begins narrowband operations.

iii. Eliminate Limitation on Duty Cycle

LoJack also seeks to eliminate limitations on duty cycles. Under the current rules, the maximum duty cycle for VLU transmissions is 1800 milliseconds every 300 seconds, with a limit of six messages in any 30 minute period, and the maximum duty cycle for base station transmissions is one second every minute. LoJack proposes that these limitations be eliminated.

LoJack recognizes that the Commission decided not to grant a similar request two years ago, in a rulemaking involving LoJack's uplink transmissions, based principally on a concern with potential interference to Channel 7 reception and with a perceived need to keep the 173.075 MHz band accessible to federal users.[8] In the intervening period, however, the public interest benefits of eliminating the duty cycle have increased and the concerns that the Commission expressed have diminished. Accordingly, it is appropriate that the Commission revisit this issue.

The facts concerning potential interference to Channel 7 reception have changed in the interim. To put the matter in perspective, it is worth noting with respect to the Channel 7 interference issue that, as discussed in additional detail in Section III.B.v of this petition, there has never been a recorded complaint of interference to Channel 7 reception from the LoJack system.

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[8] *Amendment of Section 90.20(e)(6) of the Commission's Rules to Revise the Authorized Duty Cycle on 173.075 MHz*, Report and Order, WT Docket No. 01-97, ¶¶ 14-17 (Sept. 5, 2002) ("*Duty Cycle Report and Order*").

Moreover, even the theoretical potential for such interference will decrease substantially because of modifications to the LoJack system and the shift of TV broadcasting to digital transmission. The cellular technology that LoJack will be incorporating into its system will make it possible in many cases to activate VLUs without transmitting from any base stations. The GPS technology that LoJack also will be incorporating into its system will provide critical information about a stolen vehicle's location at the outset, making it possible, in those cases in which cellular activation is not used, to confine base station transmissions to a limited area within the known vicinity of the stolen vehicle. Furthermore, the "digital transition" in the television industry will reduce the prospects for interference to Channel 7 reception from base stations and VLUs,[9] because digital television stations are less susceptible to interference from the LoJack system than are analog television stations.[10]

In addition, eliminating the base station and mobile station duty cycles carries with it important benefits. It will enable LoJack to operate parallel narrowband and wideband systems during a multi-year transition period (dual systems require more "air time" than single systems), will provide an incentive for continued innovation, and will make it possible to use the LoJack system for additional public safety and security services.

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[9] *See* "Potential for Interference to DTV Reception from LoJack Transmissions," Carl T. Jones Corporation, a copy of which is attached hereto as Appendix B. The Carl T. Jones analysis was prepared for LoJack and originally was attached to the Further Comments of Cosmos Broadcasting (May 30, 2000) concerning a waiver request that LoJack had filed. *See Duty Cycle Report and Order, supra* n. 9, at nn. 37, 58.

[10] The circumstances with respect to sharing with federal users also have changed in the interim. LoJack recently briefed the staff of the National Telecommunications and Information Administration ("NTIA"), which coordinates spectrum usage by the federal government, concerning LoJack's plans. Although NTIA made no commitments, and undoubtedly will want to make its views known in commenting on this petition, LoJack is encouraged from its discussions that its planned uses of the 173.075 MHz band and federal uses of the band are compatible.

The proposed change will have no immediate impact on third parties, because police agencies using the LoJack system presently are the only users of the 173.075 MHz. Moreover, LoJack base stations and vehicle units do not transmit continuously, even when activated. Should alternative systems appear, LoJack will, of course, share the frequency and coordinate with all future users of the band. For all of the reasons stated above, eliminating the duty cycle for operations on 173.075 MHz is in the public interest.

iv. License by Rule

LoJack also requests that the Commission authorize VLUs to be operated on a "license by rule" basis. For vehicles equipped with newer VLUs incorporating cellular technology, this change will expand LoJack's coverage from 22 states to all 50 states, because it will enable police departments to activate VLUs in those areas in which base stations have not yet been licensed and constructed. This rule change would also enable additional public safety entities, such as EMS and fire departments, to activate the VLUs. Activation on a license by rule basis poses no risk of interference, because the VLUs, once activated, will transmit at the same low power levels as when activated in areas with operational base stations.

v. Elimination of Channel 7 Studies

Finally, LoJack seeks to eliminate the requirement in Section 90.20(e)(6) for Channel 7 interference studies. At present, LoJack is required to conduct these studies for base stations that are within 169 kilometers of a Channel 7 facility. The studies are technically and financially onerous, and they have no demonstrable benefit. To the contrary, during the nearly 20 years that

LoJack has been required to conduct the studies, there have been no findings of perceptible interference to viewers of Channel 7 and no recorded complaints of interference.[11]

LoJack, moreover, remains committed to monitoring for interference problems and to mitigating interference (*e.g.*, installing filters on affected television sets) should it ever occur. Given these circumstances and the unbroken record of an absence of predicted or reported interference, the requirement for Channel 7 interference studies should be eliminated.

IV. A GRANT OF LOJACK'S PETITION WOULD SERVE THE PUBLIC INTEREST.

The Commission previously amended the SVRS rules to "enable[] the use of an SVRS technological advancement."[12] In so doing, the Commission found that the public interest would be served by allowing new technologies that "will facilitate more efficient law enforcement, a decrease in the time lag in the notification of a stolen vehicle, greater stolen vehicle recovery rates, and a greater rate of apprehension of criminals."[13] Additionally, the Commission has found merit in other systems that promote the public safety by assisting in providing prompt emergency response services.[14] In this instance, LoJack's proposed new services will aid law enforcement, EMS, fire departments, and national security entities, as the services would provide

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[11] The possibility of interference to Channel 7 reception, which has yet to occur in nearly 20 years, will be reduced even further as broadcasters transition to digital technology. *See* "Potential for Interference to DTV Reception from LoJack Transmissions," Carl T. Jones Corporation, *supra* n. 9.

[12] *In the Matter of Amendment of Section 90.20(e)(6) of the Commission's Rules to Revise the Authorized Duty Cycle on 173.075 MHz*, Report and Order, 17 FCC Rcd 16938, 16943 (2002).

[13] *Id.* at 16947; *see also In the Matter of Amendment of Section 90.20(e)(6) of the Commission's Rules to Revise the Authorized Duty Cycle on 173.075 MHz*, Notice of Proposed Rulemaking, 16 FCC Rcd 9998 (2001) (finding that it serves the public interest to support SVRS rulemaking that enhances "police performance in the recovery of stolen vehicles and apprehension of individuals suspected of committing these thefts.").

[14] *See, e.g., In the Matter of Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems*, Order, 18 FCC Rcd 21531 (2003) (noting a telematics system's ability "to assist in saving lives" by promoting "prompt emergency service in response to calls"); *In the Matter of Amendment of Part 90 of the Commission's Rules to Adopt Regulations for Automatic Vehicle Monitoring Systems*, Report and Order, 10 FCC Rcd 4695, 4701 (1995) (recognizing the "important role" of location based services).

additional safety and security features that would increase the efficiency of public safety entities in providing services to the public.

The LoJack tracking system has proven so successful that law enforcement entities have been eager to use the technology for purposes in addition to recovery of stolen vehicles. For example, the system could be used to track Alzheimer's patients straying from home, to keep tabs on criminals who are sentenced to home detention, and to verify the location of hazardous cargo. By making better information available in a more timely fashion, these and other services will reduce the demands on local police and enable the police to provide more effective assistance to individuals in need.

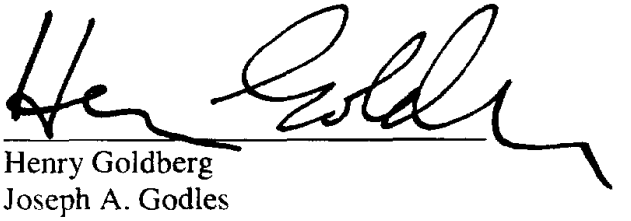
V. CONCLUSION

LoJack's proposed modifications to Section 90.20(e)(6) will help meet the need to make better use of law enforcement, public safety and national security resources in the United States. Law enforcement is seeking additional ways to protect public safety and national security. The rule changes would allow LoJack to provide services to fulfill this need. As well, the requirement for LoJack to redesign its system completely to comply with the Commission's proposed transition to narrowband will provide a one-time opportunity to design a more flexible system that will make more efficient use of its frequency.

The Commission's acceptance of LoJack's proposals will serve the public interest by enhancing the effectiveness of vehicle recovery systems, by helping law enforcement authorities to make better use of their resources, and by enabling LoJack to endow its systems with capabilities that can be used to provide additional safety and security services. LoJack, therefore, respectfully requests that the Commission adopt the rule changes proposed in this Petition for Rulemaking. The text of the proposed rule changes is attached as Appendix A.

Respectfully submitted,

LoJack Corporation



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Appendix A

TEXT OF PROPOSED RULE CHANGES[1]

Authority: §§ 4, 251-2, 303, 309, and 332, 48 Stat. 1066, 1082, as amended; 47 U.S.C. §§ 154, 251-2, 303, 309 and 332.

Title 47 of the Code of Federal Regulations, Section 2.106, is amended as follows:

§ 2.106 Table of Frequency Allocations.

* * *

UNITED STATES (US) FOOTNOTES

* * *

US312 The frequency 173.075 MHz may be authorized on a primary basis to non-Federal Government stations in the Public Safety Radio Pool, limited to police licensees, for **public safety, health and welfare, and national security related services** ~~stolen vehicle recovery systems (SVRS)~~ **under the control of law enforcement and other public safety entities.** ~~SVRS~~ These services may operate with an authorized bandwidth not to exceed 20 kHz.

Title 47 of the Code of Federal Regulations, Section 90.20(e)(6), is amended as follows:

Section 90.20 Public Safety Pool.

(e) * * *

(1) * * *

* * * * *

(6) The frequency 173.075 MHz is available ~~for stolen vehicle recovery systems~~ on a shared basis with the Federal Government **for systems used to provide public safety, health and welfare, and national security related services** ~~Stolen vehicle recovery systems are~~

[1] The version of US Footnote 312 that is amended above already reflects technical corrections, which LoJack assumes will be adopted, that the Commission has proposed in the narrowband NPRM. *See* 19 FCC Rcd at 12709, 12714. The versions of US Footnote 312 and Section 90.20(e)(6) that are amended above do not, however, reflect a requirement for narrowband operations on 173.075 MHz. Although LoJack assumes that the Commission will adopt such a requirement, it did not propose specific language in the NPRM to implement the requirement.

~~limited to recovering stolen vehicles and~~**under the control of law enforcement and other public safety entities. These systems** are not authorized for general-purpose vehicle tracking or monitoring. Mobile transmitters operating on this frequency are limited to ~~2.5~~ **5** watts power output and **are authorized to operate on a license by rule basis pursuant to Part 95 of this chapter.** ~~B~~**B**ase transmitters are limited to ~~300~~ **500** watts ERP. ~~F1D and F2D emissions~~ **Any modulation scheme, including F1D and F2D,** may be used within a maximum authorized 20 kHz bandwidth. ~~Transmissions from mobiles shall be limited to 200 milliseconds every 10 seconds, except that when a vehicle is being tracked actively transmissions may be 200 milliseconds every second. Alternatively, transmissions from mobiles shall be limited to 1800 milliseconds every 300 seconds with a maximum of six such messages in any 30 minute period. Transmissions from base stations shall be limited to a total time of one second every minute.~~ Applications for base stations operating on this frequency shall require coordination with the Federal Government. ~~Applicants shall perform an analysis for each base station located within 169 km (105 miles) of a TV Channel 7 transmitter of potential interference to TV Channel 7 viewers. Such stations will be authorized if the applicant has limited the interference contour to fewer than 100 residences or if the applicant: (i) Shows that the proposed site is the only suitable location; (ii) Develops a plan to control any interference caused to TV reception from the operations; and (iii) Agrees to make such adjustments in the TV receivers affected as may be necessary to eliminate interference caused by its operations.~~ The licensee **must not interfere with the reception of TV channel 7, and** must eliminate any interference caused by its operation to TV channel 7 reception within 30 days of the time it is notified in writing by the Commission. If this interference is not removed within the 30-day period, operation of the base station must be discontinued. The licensee is expected to help resolve all complaints of interference.

APPENDIX B

CARL T. JONES
CORPORATION

Potential for Interference to DTV Reception from LoJack Transmissions

LoJack Corporation ("LoJack") has filed a Petition for Rulemaking[1] in which it requests amendment to 47 C.F.R Section 90.20(e)(6) to permit an increase in duty cycle of transmissions from automobiles containing LoJack mobile transmission equipment. Concurrent with this filing, LoJack requested waiver of the duty cycle limits set forth in Section 90.20(e)(6) to permit immediate use of the new technology. In its filings with the FCC, LoJack has provided public interest justification for the requested amendment and waiver, including a description of how the requested amendment will reduce the potential for interference to VHF Channel 7 television reception by reducing the number of transmissions of the significantly higher power base stations[2] during the vehicle recovery process.

Cosmos Broadcasting Corporation ("Cosmos"), a VHF Channel 7 television licensee, has filed comments with the Commission in which it requests that the Commission deny the LoJack waiver request. One of the concerns that Cosmos raises in its comments is the increased potential for interference to DTV reception. This office has been retained by LoJack to evaluate the potential for interference to DTV reception on

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[1]Public Notice DA 00-402 released February 29, 2000

[2]Base stations are permitted to operate with effective radiated powers as high as 300 watts, while mobile transmitter outputs are limited to 2.5 watts which, according to LoJack engineers, results in a typical effective radiated power of only 200 to 300 milliwatts.

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VHF Channel 7 from the LoJack signal, operating on the first lower adjacent channel. A comparative analysis is contained herein which demonstrates that the DTV signal adopted by the Commission exhibits significantly better rejection capabilities to lower adjacent channel interference and thus will result in a substantially reduced potential for interference to reception. The FCC protection ratios, which are the basis for this analysis and which were developed in the context of evaluating the potential for NTSC signals to interfere with DTV reception, are themselves based on extensive laboratory and field tests.

The analog NTSC television signal currently broadcast by Cosmos on Channel 7 is contained within the six megahertz (MHz) frequency band from 174 to 180 MHz. Should Cosmos elect to operate with its newly allocated DTV signal on Channel 7, replacing the NTSC signal, it will occupy the same six megahertz frequency band. The LoJack signal is a narrow band MSK signal centered about 173.075 MHz or 925 KHz below the lower band edge of the Channel 7 signal.

FCC Rules currently specify protection ratios for both NTSC and DTV stations in terms of desired to undesired (D/U) signal levels. When the undesired or interfering signal is an NTSC signal operating on the 1st lower adjacent channel and the desired signal is also an NTSC signal, the D/U protection ratio is -3 dB, meaning that the undesired signal amplitude is permitted to be up to 3 dB (a factor of 1.4 times) greater than the desired signal amplitude. For the case where the undesired signal is an NTSC signal and the desired signal is a DTV signal, the D/U protection ratio is -48 dB, meaning that the

undesired signal amplitude is permitted to be up to 48 dB (a factor of 251 times) greater than the desired DTV signal amplitude:

Lower 1st Adjacent Channels

1. NTSC to NTSC = D/U ration = -3dB
2. NTSC to DTV = D/U ratio = -48dB

Note: The NTSC D/U ratios are specified for **video carrier** amplitudes.

This comparison is striking and demonstrates the significant improvement in the DTV receiver's ability to reject interference from a first lower adjacent channel signal. The above protection ratios are based on the interfering signal being an NTSC television signal occupying the entire lower 1st adjacent 6 MHz channel. However, when one considers that an NTSC signal has a wideband FM aural carrier only 250 KHz below the lower band edge of the desired signal, the NTSC television signal represents a greater potential for interference than does the narrowband LoJack signal, 925 KHz below the lower band edge.

In summary, the FCC's protection ratios clearly show that DTV receivers exhibit significant improvement in their ability to reject lower adjacent channel interference. Based on the analysis above it can be expected that, at a minimum, a DTV receiver will exhibit 45 dB better performance at rejecting the LoJack signal than an NTSC receiver. This improvement in interference immunity is so dramatic that concern over the increased

potential of interference to DTV performance is not warranted. To the contrary, the above analysis demonstrates that the interference potential of the LoJack signal to Channel 7 reception will be greatly reduced when DTV transmission replaces the current NTSC transmission standard.

Dated: May 9, 2000

Carl T. Jones, Jr., P.E.

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